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BEFORE THE ARIZONA CORPORATION COMMISSION

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Commissioner

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KRISTIN K. MAYES  
Commissioner

DOCKETED BY	

GARY PIERCE  
Commissioner

IN THE MATTER OF THE APPLICATION OF )  
SAGUARO WATER COMPANY TO )  
MODIFY ITS EXISTING CERTIFICATE OF )  
CONVENIENCE AND NECESSITY )

W-0816A-06-0177  
DOCKET NO. W-0816A-06-0177

APPLICATION FOR REVIEW AND  
APPROVAL OF PROPOSED HOOK-UP  
FEE TARIFF

In compliance with Decision No. 69646, dated June 6, 2007, Saguaro Water Company ("Saguaro") submits for Staff's review the proposed Hook-Up Fee Tariff solicited by the Commission. The proposed Hook-Up Fee Tariff and related hook-up fees would be applicable to new customer connections to the Saguaro water system.

The capital expenditures related to the proposed hook-up fees pertain to Saguaro's construction requirements for the 2008 - 2018 time period. The anticipated new customer growth during this period is 334 new customer connections. The off-site facilities in question include a storage reservoir and related equipment and engineering. The proportion of the \$555,000 in anticipated construction costs proposed to be funded by the proposed hook-up fees is 60%.

1  
2 Attached to this Application as Exhibit "A" is a Water System Master Plan that includes  
3 schedules setting forth the assumptions and estimated future capital expenditures upon which the  
4 proposed Saguaro hook-up fee is based, among other engineering and planning assumptions.  
5 Attached to this Application as Exhibit "B" is a copy of a proposed Saguaro Hook-Up Fee Tariff.  
6

7 The Saguaro Water Company requests that the Commission review the proposed Hook-Up  
8 Fee Tariff and the hook-up fees which are the subject of this Application and issue an order  
9 approving the tariff and related hook-up fees.  
10

11 RESPECTFULLY SUBMITTED this 5<sup>th</sup> day of December, 2007.  
12

13 By:   
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19 Attorneys for  
20 Saguaro Water Company

21 ORIGINAL and thirteen (13)  
22 copies of the foregoing filed this  
23 6<sup>th</sup> day of December, 2007, with:

24 Arizona Corporation Commission  
25 Docket Control – Utilities Division  
26 1200 W. Washington Street  
Phoenix, Arizona 85007

1 COPY of the foregoing hand-delivered  
2 this 6<sup>th</sup> day of December, 2007, to:

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# **EXHIBIT A**

**SAGUARO WATER COMPANY**


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**WATER SYSTEM  
MASTER PLAN**

*Prepared for:*

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**OCTOBER 2007**  
Project No. 218.51 A 8000



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Exhibit 1. Saguaro Water System Master Plan

**LIST OF ACRONYMS**

ADD	Average Daily Demand
ADEQ	Arizona Department of Environmental Quality
CC&N	Certificate of Convenience & Necessity
gpcd	gallons per capital per day
gpm	gallons per minute
lf	lineal feet
MG	million gallons
mgd	million gallons per day
PDD	Peak Day Demand
PHD	Peak Hour Demand
PRV	Pressure Reducing Valve
psi	pounds per square inch
PSV	Pressure Sustaining Valve
UFC	Uniform Fire Code



## CHAPTER 1. INTRODUCTION

The purpose of this report is to prepare a potable water system master plan document for the Saguaro Water Company water system to address current and future water system infrastructure needs. This document will provide a planning basis for present and future operation of the Saguaro Water system in a manner consistent with existing facilities, physical constraints, and resources of Saguaro Water system. The infrastructure requirements will be developed based on Arizona Department of Environmental Quality (ADEQ) requirements and standard engineering practices.

This master plan is intended to be a flexible, working document allowing Saguaro Water Company staff to adjust planning and water system facilities to meet future conditions. However, this document cannot anticipate every future outcome and, as such, should be reviewed periodically to update the assumptions for water system boundaries, population growth, projected water usage, and infrastructure requirements. It is recommended that these updates be provided at three-year intervals, or as appropriate, to allow timely updates to the capital improvement program and funding issues.

The Saguaro Water Company is a private water utility located approximately one mile east of the Tucson City limits. The Saguaro Water Company's Certificate of Convenience and Necessity (CC&N) encompasses approximately 2,400 acres and is located adjacent to and easterly of Spanish Trail Water Company. The water company currently serves approximately 1,000 customers.

## CHAPTER 2. SCOPE AND APPROACH

### 2.1. DEFINE KEY ISSUES

The development of a master plan requires defining a strategic approach, key issues, and policies early in the planning process. These key issues and policies, and their initial assumptions, are required to design the ultimate water system. The policies set within this section will affect the required water system layout, facility sizing, reliability, and costs of the required infrastructure.

### 2.2. WATER SYSTEM PLANNING HORIZON

The projected planning horizon for the population and water system demands will be buildout. Population projections and demands will be provided for the existing conditions and the buildout condition.

### 2.3. WATER RESOURCES AND DEVELOPMENT

The Saguaro Water System currently relies solely on groundwater supplies for its production water source. It is anticipated that the water company will continue to develop new groundwater wells to serve drinking water needs. The planning of well locations must take into account a number of factors including the hydrologic availability of water, location of existing water system infrastructure, and location of the demand.

### 2.4. WATER SOURCE CAPACITY AND QUALITY REQUIREMENTS

Engineering criteria require that the well system be capable of providing peak-day demand (PDD) for the entire system with the largest well out of service. The master plan will develop the capacity requirements and locations for wells to meet this requirement.

It is the Saguaro Water Company's policy to provide for future chlorination of the system to maintain adequate residual chlorine concentrations throughout the water system. This policy will help alleviate bacteriological contamination that may occur through airborne contamination of reservoirs or stagnant water lines and transmission mains.

### 2.5. STORAGE REQUIREMENTS

Storage capacity is a highly critical element in the design and operation of water systems. The storage will provide operational flexibility and system reliability. Reservoir storage is used primarily to accommodate hourly demand fluctuations, PDD fluctuations, fire flow requirements, and emergency reserve storage. Each of these requirements added together form the required storage capacity. Current

ADEQ criteria typically require the average daily demand (ADD) of the peak month plus fire flow requirements to be the minimum storage capacity. Under certain circumstances, in service areas with well capacities, the storage capacity may be lowered. Due to the available well capacity within Saguaro Water System and the inclusion of fire flow capacity, this master plan will develop storage criteria using 1.0 times ADD plus fire flow, rather than ADD of the peak month plus fire flow.

## 2.6. PRESSURE REQUIREMENTS

Pressure extremes in water systems result in a potential for contamination to enter the system. Low pressures may allow polluted fluids to be forced into the system. High pressures may cause ruptures or breaks. Normal working pressure in the distribution system should not be less than 40 pounds per square inch (psi). System pressures under peak-day conditions should not drop below 35 psi anywhere within the system. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. This is generally understood to mean that the minimum residual pressure must be 20 psi for each customer in a fire flow event from any hydrant, during a flow condition of peak day plus fire flow. Maximum pressures of as much as 100 psi can be allowed in small, low-lying areas not subject to high-flow rates and surge pressure. The Uniform Plumbing Code limits water pressure within the individual property owners' plumbing to 15 to 80 psi. Boosting or regulating the pressure from the meter to the customer is the responsibility of the customer.

## 2.7. FIRE FLOW POLICY

The Saguaro Water Company service area includes a number of older subdivisions that were developed prior to enforcement of the Uniform Fire Code (UFC). These areas do not necessarily have the currently required fire flow capacity per the UFC. These areas are grand fathered and not required to be retrofitted to meet UFC standards.

There are generally two considerations to providing adequate fire flow. The first consideration includes offsite requirements such as the volume of fire flow storage available in reservoirs, adequately designed pressure zones, and the size of transmission mains. The second factor is the internal distribution system within the neighborhood, including main sizes, adequate looping, and fire-hydrant placement. The goal of the master plan is to develop adequately sized reservoirs, properly designed pressure zones, and water distribution mains sized to provide as much fire flow as practical to the existing areas, and to provide adequate fire flow for new development.

Fire flow requirements for homes typically vary from 500 to 1,500 gallons per minute (gpm), depending on the size of the home and the requirements of the fire district. The typical residential subdivision will have a fire flow requirement of 1,000 gpm for two-hour duration, although required flows can be 1,500 gpm or higher for houses larger than 3,600 square foot under roof. Higher flows can often be reduced through the use of residential sprinkler systems. Commercial facility fire flow requirements also vary

depending on the square footage of the commercial building, occupancy type, building material type, exposure distance to other buildings, and whether the structure is sprinklered. Typical commercial facilities will have fire flow requirements for 1,500 to 2,500 gpm for a two- to three-hour duration. Fire flows can be adjusted by the local fire district, if the nature of the system or the rural nature of the area precludes the full fire flow per the UFC. For purposes of the master plan, the fire flow will be assumed to be 1,000 gpm for two hours for residential developments and 1,500 gpm for two hours for commercial. It is assumed that larger residential homes and commercial facilities will be equipped with a fire sprinkler system.

## **2.8. WATER MAIN REQUIREMENTS**

The water distribution systems should be sized and arranged to minimize friction-generated line losses and provide the required fire flows. The policy of Saguaro Water Company will be to require looped water distribution systems for the water main grid system wherever possible. In addition, appropriate valving locations and intervals should be required to isolate small sections of main during breakages and reduce the number of residences out of service.

## **2.9. LAND ACQUISITION**

The master plan will help to provide locations and sizes for future wells, reservoirs, booster stations, and major distribution mains to serve the water system. These facilities will be generally located on water system maps. Many factors and constraints will be required to determine the final location for each site. These factors include the proximity to existing water transmission mains, the proximity to three-phase power, access to local public streets, specific elevation requirements for floating reservoirs, hydrologic requirements for well sites, noise and buffer requirements for booster stations and wells, aesthetic screening requirements for aboveground facilities, and the cost of land acquisition and/or the availability of other preferable sites.

## **2.10. SYSTEM UPGRADES**

The master plan will develop the system design criteria to guide the water company in designing water facilities. The system design criteria will include methods for demand calculations, peaking factors, water supply requirements, the number and capacity of wells required, reservoir storage and booster station capacity requirements, emergency backup systems, and distribution system sizing.

The master plan will identify upgrade requirements for the water system at buildout, and specify the required new facilities and/or facility upgrades. These facilities may include additional or upgraded wells, booster station upgrades, reservoir capacity additions, and transmission and distribution main augmentations. The projected cost estimates will be provided for these facilities.

## CHAPTER 3. ENGINEERING CRITERIA

Based on the information presented in Chapter 2, the system design criteria for the Master Plan are described below in terms of demand, supply, storage, and distribution system assumptions.

### 3.1. DEMAND CRITERIA

Demand, residency estimates, and peaking factors are based on the typical criteria for similar systems in southern Arizona area.

- Average daily per capita water usage for single-family residential ..... 110 gpcd
- Average number of persons per single-family dwelling unit ..... 2.7
- Ratio of peak-day to average-day use ..... 2.0
- Ratio of peak-hour to average-day use ..... 3.5

gpcd – gallons per capita per day

### 3.2. SUPPLY CRITERIA

- Well capacity to meet PDD with the largest well out of service.
- Minimum booster capacity to zones without elevated storage to meet peak-hour demand or PDD plus fire flow, whichever is larger.

### 3.3. STORAGE CRITERIA

- Provide storage volume equal to a minimum of 1.0 times the ADD.
- Provide additional storage volume required to provide 1,000 gpm or 1,500 gpm fire flow for residential and commercial development, respectively, for two-hour duration.

### 3.4. DISTRIBUTION SYSTEM CRITERIA

- System design and construction to meet Saguaro Water Company and ADEQ requirements.
- Maximum friction head loss for lines up to and including 8-inches in size to be 8 feet per 1,000 feet or less. Head loss for lines over 8-inches in size to be 5 feet per 1,000 feet or less, according to pipe size.
- Distribution lines to be sized and arranged to provide required fire flows.
- Water will be supplied at the customer's meter within a static pressure range of 35 to 85 psi. Due to localized conditions, certain locations may receive water pressure slightly less or greater.

## CHAPTER 4. EXISTING SYSTEM ANALYSIS

### 4.1. CONNECTIONS AND USAGE

The existing Saguaro Water System serves approximately 994 metered connections. The total water usage including construction water is approximately 103.0 million gallons (MG) within the Saguaro Water Company for the calendar year 2006.

### 4.2. EXISTING SYSTEM OVERVIEW

The Saguaro Water service area is separated into three pressure zones. The zone boundaries and high water elevations are shown in Table 1. The zone delineation is shown on Exhibit 1. Currently, the H+ Zone only serves the 47 units in Rincon Desert Estates subdivision by direct connection of Saguaro north and south wells. The north and south wells also pump to the 500,000 gallon H Zone storage reservoir at Camino Loma Alta reservoir site through an altitude valve and a pressure sustaining valve (PSV) located at the reservoir site. The altitude valve is controlled by the water level in the reservoir and the PSV is set to maintain an upstream pressure of 25 psi. When the valves are closed, the pressure reducing valve (PRV) upstream pressure is approximately 40 psi. The I+ Zone water system serves the majority of Saguaro Water service area through the I+ Zone booster station pumping from the 500,000 gallon storage reservoir. The J Zone water system serves the east part of Coyote Creek development through an inline booster station. The J Zone inline booster station is supplied capacity from the I+ Zone booster station located at the H Zone reservoir site. The Saguaro Water Company has a third well located at the west side of the service area, north of Jacaranda Village Subdivision. This well pumps to the H Zone reservoir through a dedicated 12-inch well collection line.

**Table 1. Saguaro Water Company Pressure Zone Boundaries**

Zone	High Water (elevation feet)	Elevation Boundaries (feet)	Static Pressure (psi)
H	3,284	3,012 – 3,120	118 – 71
I+	3,373	3,120 – 3,250	110 – 53
J	3,422	3,250 – 3,330	74 – 40

### 4.3. EXISTING WELLS

The well capacity within the existing Saguaro Water System consists of three active wells with a total capacity of approximately 860 gpm or 1.24 million gallons per day (mgd). Table 2 provides a summary of the well capacity, zone served by the well, and approximate elevation of the well site. The existing wells, their capacity, and current utilization during the peak month of the year are shown in Table 3. The average-month data in Table 3 was obtained from operational records for the 2006 calendar year. The peak-month data for the utilization calculation relied on operational data from May 2006.

**Table 2. Existing Well Summary**

Facility Name	Approximate Elevation (feet)	Capacity (gpm)	Zone Served	Casing Diameter (inch)
North Well	3,082	160	H+, I+, J	12
South Well	3,146	280	H+, I+, J	10
Well No. 3	3,100	420	I+, J	12
<b>TOTAL</b>	-	<b>860</b>	-	-

**Table 3. Well System Utilization**

Facility Name	Capacity (gpm)	Capacity (mgd)	2006 Average Usage (mgd)	2006 Peak Month Usage (mgd)	Percent Peak Month Capacity
North Well	160	0.23	0.05	0.07	30%
South Well	280	0.40	0.09	0.12	30%
Well No. 3	420	0.61	0.14	0.18	30%
<b>TOTAL/AVERAGE</b>	<b>860</b>	<b>1.24</b>	<b>0.28</b>	<b>0.37</b>	<b>30%</b>

#### 4.4. EXISTING RESERVOIRS AND BOOSTER STATIONS

The capacities and elevations of reservoirs and booster stations within Saguaro Water are summarized in Table 4. The total booster station capacity within the Saguaro Water system is approximately 3,885 gpm and the total reservoir capacity is 500,000 gallons.

**Table 4. Existing Reservoir/Booster Summary**

Facility Name	Approximate Site Elevation (feet)	Storage (gallons)	Reservoir High Water Elevation (feet)	Booster Capacity (gpm)	Boost to Zone (high water elevation)
Camino Loma Alta H Zone Reservoir	3,192	500,000	3,212	2,635	I+ (3,373)
Coyote Creek Inline J Zone Booster	3,270	-	-	1,250	J (3,422)
<b>TOTAL</b>	-	<b>500,000</b>	-	<b>3,885</b>	

#### 4.5. EXISTING SYSTEM DEMANDS

The existing water system, as shown on Exhibit 1, is divided into three separate zones: H+, I+, and J Zones. The I+ Zone includes the majority of the service area. Table 5 presents the existing and currently approved but unbuilt dwelling units and the ADD, PDD, and peak hourly demand (PHD) for the existing Saguaro Water System based on the engineering criteria presented in Chapter 2. Currently approved but unbuilt units are considered existing or committed for purposes of this master plan because these developments have already signed line extension agreements that include the costs for their required water system infrastructure upgrades. The Saguaro Water Company system is also currently providing

capacity to the Academy Village development in Spanish Trail Water Company. However, planned improvements to the Spanish Trail Water Company system will eliminate this demand from the Saguaro Water Company system.

**Table 5. Existing (Committed) Saguaro Water System Demands**

<b>Development Area</b>	<b>No. of Units</b>	<b>Average (Committed) Daily Demand (Gallon)</b>	<b>Average Daily Demand (gpm)</b>	<b>Peak Daily Demand (gpm)</b>	<b>Peak Hour Demand (gpm)</b>
Jacaranda Village	36	10,692	7	15	26
Antler Crest Estates	145	43,065	30	60	105
Rancho Loma Alta	24	7,128	5	10	17
Whisper Ranch	46	13,662	9	19	33
Rincon Trails	505	149,985	104	208	365
Rincon Valley Estates	15	4,455	3	6	11
Spanish Trail Estates	121	35,937	25	50	87
Rincon Desert Estates	47	13,959	10	19	34
Coyote Creek	395	117,315	81	163	285
Bluff Creek	40	11,880	8	17	29
Estates at Old Spanish Trail	104	30,888	21	43	75
Existing homes to the east of Rincon Valley Estates	5	1,485	1	2	4
<b>TOTAL</b>	<b>1,483</b>	<b>440,451</b>	<b>306</b>	<b>612</b>	<b>1,071</b>

The usage demands were calculated based on the previous design criteria and are as follows:

$$\text{ADD} = \text{units} \times 2.7 \text{ persons/unit} \times 110 \text{ GPCD/1,440} = \text{units} \times 0.21 \text{ gpm/unit}$$

$$\text{PDD} = \text{ADD} \times 2.0 = \text{units} \times 0.42 \text{ gpm/unit}$$

$$\text{PHD} = \text{ADD} \times 3.5 = \text{units} \times 0.74 \text{ gpm/unit}$$

#### 4.6. EXISTING SYSTEM REQUIREMENTS

The water system design criteria as previously provided was used to develop the existing capacity upgrade requirements for Saguaro Water System, including the capacity of wells, storage, boosters, and mains.

##### 4.6.1. Wells

Well production requirements are based on meeting PDD with the largest well out of service. A summary of the existing well capacities and the additional well capacity required is presented in Table 6. The existing (committed) Saguaro Water System has a PDD of 612 gpm and requires 1,018 gpm of well production, including reserve capacity of 420 gpm. The existing well capacity, which is continually available to serve PDD, is 860 gpm for Saguaro Water system.



The existing well capacity with the largest well out of service is 440 gpm. Based on existing system demand of 612 gpm, the Saguaro Water System requires approximately 172 gpm additional well capacity to meet the requirements. It is recommended that this capacity be included in the proposed future well capacity as discussed in Chapters 5 and 6.

**Table 6. Existing Well Capacity Requirements**

	<b>Well Requirement (PDD-gpm)</b>	<b>Existing Well Capacity (gpm)</b>
Existing System	612	860
Reserve Capacity*	420	-
<b>TOTAL</b>	<b>1,032</b>	<b>860</b>
<b>REQUIRED ADDITIONAL CAPACITY</b>		<b>172 gpm</b>

\*Equal to the capacity of the largest well to allow for outages.

#### 4.6.2. Storage

Storage sizing requirements are based on meeting 1.0 times the ADD plus fire flow. Fire flow has been assumed to be 1,000 gpm for two-hour duration for the existing Saguaro Water System. A summary of the existing storage capacity and the additional storage capacity required is presented in Table 7. According to Table 7, the system requires an additional 60,450 gallons of storage to meet the existing system storage requirement. It is recommended that future system storage requirements be examined before finalizing reservoir sizes. The recommended reservoir sizing for both existing and future system upgrades is discussed in Chapters 5 and 6.

**Table 7. Existing Reservoir Capacity Requirements**

<b>Potable Storage Requirement (gal)</b>	<b>Fire Flow Storage Requirement (gal)</b>	<b>Total Storage Requirement (gal)</b>	<b>Existing Storage Capacity (gal)</b>	<b>Shortage Storage Capacity (gal)</b>
440,450	120,000	560,450	500,000	60,450
<b>REQUIRED ADDITIONAL CAPACITY</b>			<b>60,450 gallons</b>	

#### 4.6.3. Booster Station and Transmission Facilities

Booster station and transmission facility sizing is based upon conveying the PDD plus fire flow or PHD, whichever is greater. For small water systems such as Saguaro Water System, PDD plus fire flow is typically greater than PHD. For the existing Saguaro Water System, it has been assumed that the booster stations and transmission mains will not be upgraded to include fire flow capacity for the areas that are not required to achieve a particular fire flow. Fire flow capacity is required for some recently developed residential subdivisions within Saguaro Water service area, and will be included for future system growth. Booster station capacities are currently sufficient to meet the requirement for conveying PDD plus fire flow in the water system, as shown in Table 8.

**Table 8. Existing Booster Capacity Requirements**

<b>Zone</b>	<b>Peak Daily Demand/Maximum Instantaneous (gpm)</b>	<b>Fire Flow Requirement (gpm)</b>	<b>Total Booster Capacity Requirement (gpm)</b>	<b>Existing Booster Capacity (gpm)</b>	<b>Excess Booster Capacity (gpm)</b>
I+ Zone (includes J Zone)	592	1,000	1,592	2,635	1,043
J Zone	172	1,000	1,172	1,250	78

Due to the fact that J Zone inline booster capacity is supplied by the I+ Zone booster and the H+ Zone demand is negligible, the I+ Zone booster is required to provide PDD for the entire Saguaro Water System plus fire flow, which is approximately 1,592 gpm. The existing I+ Zone booster has a sufficient capacity of 1,592 gpm to provide PDD plus fire flow.

The J Zone inline booster station currently has a pumping capacity of 1,250 gpm. This J Zone booster station serves approximately 109 residential units with a maximum instantaneous flow of approximately 172 gpm. Based on the assumption that the fire flow requirement is 1,000 gpm for two hours for residential development, the total required J Zone booster capacity is approximately 1,187 gpm at buildout. The J Zone booster station currently has sufficient capacity to meet the design criteria.

Hydraulic modeling of the water system indicates that transmission capacity is sufficient for the delivery of PDD plus fire flow through the water system.

## CHAPTER 5. FUTURE SYSTEM ANALYSIS

### 5.1. POPULATION PROJECTIONS

The water system analysis is based on the approximate number and type of units at buildout for Saguaro Water System. The majority of the Saguaro Water Company service area has been developed or platted. There are 50 acres of undeveloped area within Saguaro Water Company service area currently planned for a 15-unit subdivision – Coyote Creek II. For the undeveloped areas that have not been planned, the number and type of units were estimated based on approved zoning. The buildout estimates for these areas are shown on Exhibit 1. Table 9 provides a summary of the projected units in these planned and zoned areas.

**Table 9. Saguaro Water System Projected Units**

Approved Zone	Area (acres)	Minimum Site Area (square foot)	Projected Units
Coyote Creek II	50	180,000	15
RH Rural Homestead	615	180,000	168
GR-1 Rural Residential	37	36,000	45
CR-1 Single Residence	15.5	36,000	19
CB-1 Local Business	9	4,500	87
<b>TOTAL</b>	<b>676.5</b>	<b>-</b>	<b>334</b>

It is estimated that approximately 1,800 residential dwelling units will be present in the service area at buildout. The total population to be served by the Saguaro Water Company will be approximately 4,900 people.

### 5.2. FUTURE SYSTEM DEMANDS

The demand criteria in Section 3.1 were used in calculating the buildout demands for the water system. A summary of the water system demands is presented in Table 10.

**Table 10. Saguaro Water System Demands at Buildout**

Development Area	No. of Units	Average Daily Demand (gallon)	Average Daily Demand (gpm)	Peak Daily Demand (gpm)	Peak Hour Demand (gpm)
Existing	1,483	440,451	306	612	1,071
Planned	15	4,455	3	6	11
Zoned	319	94,743	66	132	230
<b>TOTAL</b>	<b>1,817</b>	<b>539,649</b>	<b>375</b>	<b>750</b>	<b>1,312</b>

### 5.3. FUTURE SYSTEM SIZING

The water system design criteria, as previously provided, were used to develop the future water system capacity requirements for Saguaro Water system. Future system requirements include the capacity of wells, storage, boosters, and mains to serve future demands. The proposed future system upgrades are shown in Exhibit 1.

#### 5.3.1. Wells

Well production requirements are based on meeting PDD with the largest well out of service. For purposes of the calculation, it is assumed that the reserve well capacity is 420 gpm, which is approximately equal to the largest well capacity. A summary of the required well capacities and the future additional well capacity required is presented in Table 11.

Based on projected buildout conditions, the Saguaro Water System requires approximately 1,164 gpm in well capacity to meet the requirements stated above. Saguaro Water System has existing well capacity of 860 gpm. The existing well capacity assuming the largest well out of service is 440 gpm. To meet future system requirement, an additional well with approximately 310 gpm of capacity is required.

**Table 11. Future Well Capacity Requirements**

	<b>Well Requirement (PDD-gpm)</b>	<b>Existing Well Capacity (gpm)</b>
Water System at Buildout	750	860
Reserve Capacity*	420	-
<b>TOTAL</b>	<b>1,170</b>	<b>860</b>
<b>REQUIRED ADDITIONAL CAPACITY</b>		<b>310 gpm</b>

\*Equal to the capacity of the largest well.

#### 5.3.2. Storage

Storage sizing requirements are based on meeting 1.0 times the ADD plus fire flow. Fire flow demands will be served from the reservoir that serves the zone through boosters or PRVs. Considering future potential commercial development within Saguaro Water Company service area, a fire flow of 1,500 gpm for two-hour duration is assumed for future water system.

The storage requirements for Saguaro Water System are presented in Table 12. The Saguaro Water System requires approximately 719,650 gallons of storage capacity to meet the storage criteria. Saguaro Water System currently has storage capacity of 500,000 gallons, and an additional 219,650 gallon storage capacity is required to meet design criteria.

Table 12. Future Reservoir Capacity Requirements

Potable Storage Requirement (gal)	Fire Flow Storage Requirement (gal)	Total Storage Requirement (gal)	Existing Storage Capacity (gal)	Shortage Storage Capacity (gal)
539,650	180,000	719,650	500,000	219,650
REQUIRED ADDITIONAL CAPACITY			219,650 gallons	

### 5.3.3. Booster Station and Transmission Facilities

The booster capacity is based on providing PDD plus fire flow or peak hour demand, whichever is greater. For relatively small water systems such as Saguaro Water System, PDD plus fire flow is typically greater than PHD. The fire flow is assumed to be 1,500 gpm for two-hour duration for the future Saguaro Water system. Booster station capacities are currently sufficient to meet the requirement for conveying PDD plus fire flow in the water system as shown in Table 13.

Table 13. Existing Booster Capacity Requirements

Zone	Peak Daily Demand/Maximum Instantaneous (gpm)	Fire Flow Requirement (gpm)	Total Booster Capacity Requirement (gpm)	Existing Booster Capacity (gpm)	Excess Booster Capacity (gpm)
I+ Zone (includes J Zone)	750	1,500	2,250	2,635	385
J Zone	187	1,000	1,187	1,250	63

Due to the fact that J Zone inline booster capacity is supplied by I+ Zone booster and the H+ Zone demand is negligible, the I+ Zone booster is required to provide PDD for the entire Saguaro Water System plus fire flow, which is approximately 2,244 gpm. The existing I+ Zone booster has a sufficient capacity of 2,635 gpm to provide PDD plus fire flow.

The J Zone inline booster station currently has a pumping capacity of 1,250 gpm. This J Zone booster station will serve approximately 124 residential units with a maximum instantaneous flow of approximately 187 gpm. Based on the assumption that the fire flow requirement is 1,000 gpm for two hours for residential development, the total required J Zone booster capacity is approximately 1,187 gpm at buildout. The J Zone booster station currently has sufficient capacity to meet the design criteria.

Hydraulic modeling of the water system indicates that transmission capacity is sufficient for the delivery of PDD plus fire flow through the water system. One 12-inch water main that is currently used for delivering of H Zone water to Academy Village in Spanish Trail Water system will eventually be converted over for the I+ Zone use in the Saguaro Water Company system.

#### **5.4. PROPOSED FACILITIES – FUTURE SYSTEM REQUIREMENTS**

The facilities proposed to meet the future system requirements are described below. These facilities are also shown on Exhibit 1.

##### **5.4.1. Well System Requirements**

In accordance with Table 11, the future buildout well requirement of the Saguaro Water System is approximately 1,170 gpm, which is equivalent to approximately 1.7 mgd in capacity requirements. In order to meet this buildout capacity requirement, Saguaro Water System will require an additional well with approximate capacity of 310 gpm, of which approximately 172 gpm will be to meet existing system demands.

Several factors will determine the probable location of the new wells. These factors include well-spacing analysis, proximity to the greatest and most efficient hydrologic aquifer supply, and proximity to the distribution system. It is the intention of Saguaro Water Company to drill a new well at approximately 1,700 feet west of Well No. 3. This new well will be connected to the existing 12-inch well collection line at Well No. 3 via a new 8-inch water line. A disinfection system and telemetry will be provided at this well site.

##### **5.4.2. Reservoir System Requirements**

Based on Table 12, Saguaro Water System requires approximately 219,650 gallons of storage capacity to meet 1.0 times ADD plus fire flow requirement of which approximately 60,450 gallons is to serve demands of the existing system. A new 1.1 MG reservoir is planned adjacent to the 500,000 gallon storage reservoir at Camino Loma Alta reservoir site and a portion of this reservoir will be allocated to Saguaro Water Company. This 1.1 MG reservoir will be primarily a storage facility to float the H Zone of the Spanish Trail Water system, but will include excess capacity for Saguaro Water Company. The reservoir will provide approximately 200,000 gallons of storage capacity for Saguaro Water System, and 900,000 gallons of storage capacity for Spanish Trail Water System. A two-way metering system is proposed between the new 1.1 MG reservoir and the 500,000 gallon existing reservoir to register actual water usage for each water company.

##### **5.4.3. Booster Station Requirements**

Saguaro Water System currently has sufficient booster capacity to serve the future water system at buildout.

## CHAPTER 6. INFRASTRUCTURE COST ESTIMATES

### 6.1. FUTURE SYSTEM COST PROJECTIONS

In order to meet future system requirements, cost projections have been provided to predict the ultimate infrastructure costs. Saguaro Water Company will need to construct 200,000 gallon storage capacity, a new well, and approximately 1,700 lineal feet (lf) dedicated 8-inch well collection line from the proposed new well to the 12-inch well collection line at Well No. 3 site. The total cost to construct these facilities to meet current standards is estimated to be approximately \$1.12 million (Appendix A). The \$1.12 million will facilitate the construction of 1,700 lf of 8-inch well collection line, 200,000 gallons out of 1.1 MG of reservoir storage capacity and 300 gpm of well capacity. The cost allocation of the \$1.12 million of infrastructure will include approximately \$813,000 for a new well, \$117,000 for well collection line, and \$188,000 for reservoir storage. Appendix A lists the proposed projects in detail with cost projections for each project.

### 6.2. COST PROJECTION ASSUMPTIONS

Due to the fact that the master plan planning document shows conceptual layouts for proposed facilities, assumptions were made to predict probable construction costs. Standard assumptions were made for several categories of improvements. The assumptions made for the infrastructure proposed in the master plan are listed in Section 6.2. The costs as described below have been used to calculate the cost projections in Sections 6.1.

#### 6.2.1. Installation of Water Mains

Projections in the master plan indicate that approximately 1,700 lf of 8-inch dedicated well collection line will need to be installed at buildout. Recent bids in other water utilities, and applying standard assumptions for soil conditions, the following cost were used:

- \$55 per lf of 8-inch water main

This cost assumption includes valves, fittings, and appurtenances required for the installation of the proposed water mains. The cost assumption does not include easement acquisition.

#### 6.2.2. Installation of Welded Steel Reservoirs

Projections of Saguaro Water System storage requirements indicate that approximately 200,000 gallons of storage will be required at build-out. Saguaro Water Company and Spanish Trail Water Company will share a 1.1 MG reservoir to be built adjacent to the Saguaro Water Company 500,000 gallon H Zone reservoir at the Camino Loma Alta reservoir site. Out of the 1.1 MG capacity, Saguaro Water Company

will reserve 200,000 gallons for its storage requirement. Two-way metering system will be provided between the two reservoirs to count for the actual water usage for each water company.

The 1.1 MG reservoir is proposed to be welded steel reservoir, and a cost of \$0.75 per gallon of storage is estimated using the information from recent bid openings and standard assumptions. This cost assumption includes the steel reservoir, required site work, site piping, telemetry, fencing, and landscaping.

### **6.2.3. Well Installations**

The master plan estimates that one with an approximate capacity of 400 gpm will be required to meet the supply demands of Saguaro Water System. Using recent bids and applying standard assumptions for drilling rig requirements for access, a cost of \$650,000 was assumed to drill and equip a new well. This lump-sum cost projection includes standard drilling operations, well casing, sanitary seal, well column tube and shaft, and pump motor bowl assembly, assuming the wells are to be drilled using the reverse-circulation, air-rotary drilling rig. The cost assumption also includes components for site piping and equipment, site grading, block walls, telemetry, and site acquisition.

### **6.2.4. Engineering and Contingencies**

Due to the planning nature of the locations of the facilities proposed in the master plan, contingencies are added to reflect unforeseen conditions that may affect the individual projects. Unforeseen conditions can range from environmental issues that may need to be addressed by individual projects, to easements that may need to be acquired for pipeline construction. This cost component also includes engineering fees, permits, inspection, and project management. For the cost estimates in Section 6.1, engineering and contingencies of 25 percent have been included.

## **6.3. EXISTING VERSUS FUTURE BREAKDOWN**

The proposed infrastructure upgrades will be considered based on which portion of the new facilities will benefit the existing system and which will benefit future developments, as the funding mechanisms for these two groups of customers differs. Facilities required to serve the existing system requirements will be paid for from the water company rates. Facilities required for future growth will be paid for by development through a proposed hook-up fee tariff. The Saguaro Water System requires an additional well capacity of 172 gpm for the existing system, and an additional capacity of 310 gpm at buildout. Approximately 55 percent of the additional well capacity will be allocated for the existing system customers. Out of the cost of \$813,000 for the proposed new well and \$117,000 for the dedicated well collection line, \$512,000 will be contributed by the existing system and \$418,000 will be contributed by future growth.



The Saguaro Water System requires 60,450-gallons additional storage for the existing system, and 159,200-gallons of additional storage at buildout, which means that approximately 27 percent of the additional storage capacity will be allocated for the existing system customers. Out of the \$188,000 cost for construction of the new storage capacity, approximately \$51,000 will be contributed by the existing system and \$137,000 will be contributed by future growth.

The total cost of infrastructure upgrades to benefit future customers is \$555,000 benefiting 334 units, at a unit cost of \$1,662.

**APPENDIX A**

**INFRASTRUCTURE  
COST  
PROJECTIONS**

# SAGUARO WATER SYSTEM MASTER PLAN

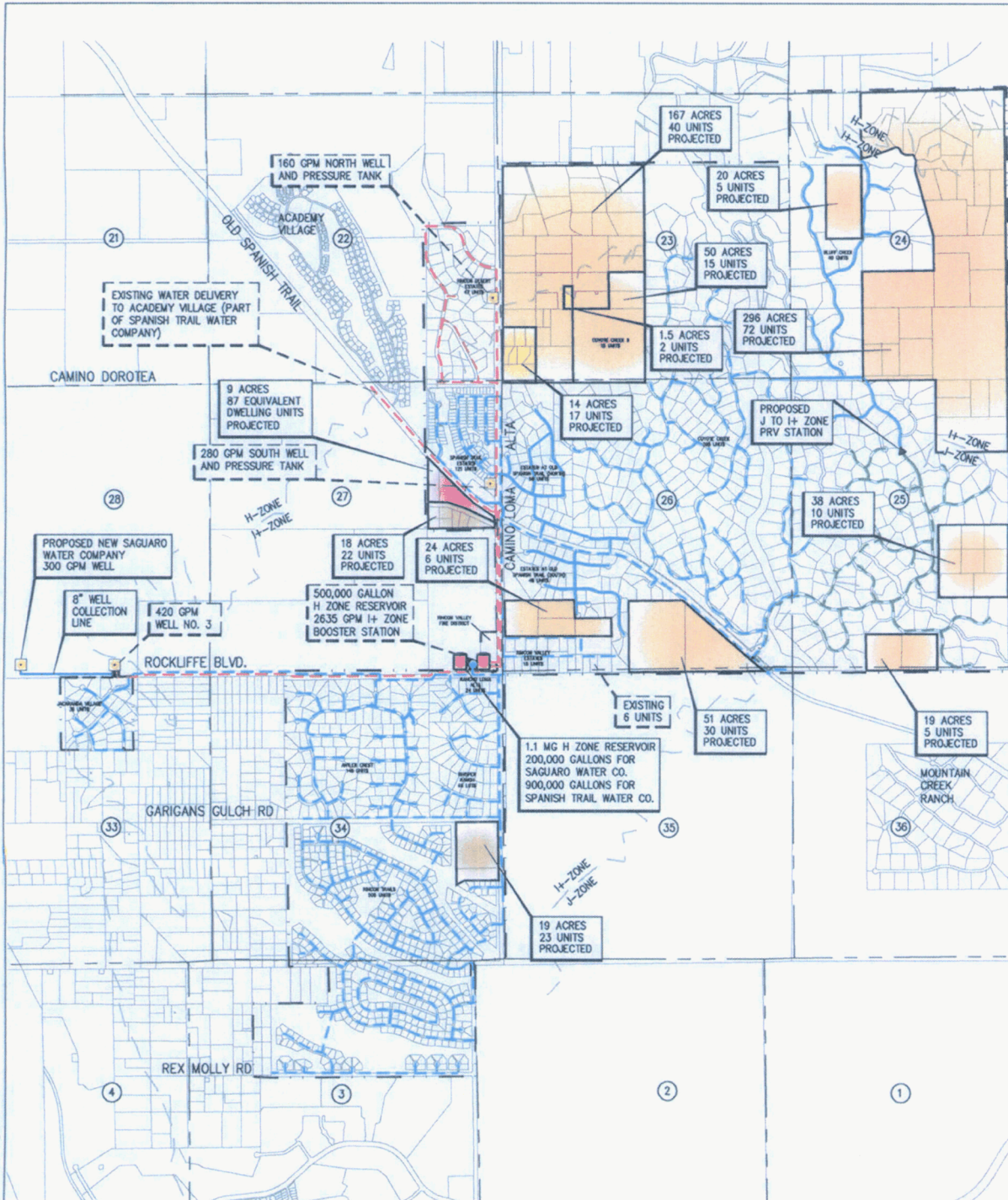
## COST SUMMARY

MASTER PLAN REQUIREMENTS									
Project No.	Project Identification	8 Inch Main (LF)	8 Inch Main Sub-Total	Steel Reservoirs (GAL)	Steel Reservoirs Sub-Total	New Wells	Project Sub-Totals	25% Eng. & cont.	Total
1	Proposed New 310 gpm Well					\$650,000	\$650,000	\$162,500	\$812,500
2	8-inch reservoir fill line	1,700	\$93,500				\$93,500	\$23,375	\$116,875
3	200,000 gallons of new 1.1 MG Camino Loma Alta Reservoir			200,000	\$150,000		\$150,000	\$37,500	\$187,500
	<b>Total</b>	<b>1,700</b>	<b>\$93,500</b>	<b>200,000</b>	<b>\$150,000</b>	<b>\$650,000</b>	<b>\$893,500</b>	<b>\$223,375</b>	<b>\$1,116,875</b>

**EXHIBIT 1**

POTABLE WATER SYSTEM  
MASTER PLAN

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# LEGEND

- SPANISH WATER COMPANY SERVICE BOUNDARY
- ZONE BOUNDARY
- HIGH WATER ELEVATION
- ⊙ SECTION NUMBER
- H-ZONE
- I-ZONE
- J-ZONE
- WELL COLLECTION LINE
- EXISTING PIPELINES
- PROPOSED PIPELINES
- RH ZONE
- CR-1 ZONE
- GR-1 ZONE
- CB-1 ZONE
- ⊙ BOOSTER STATION
- RESERVOIR
- ⊙ WELL SITE

## ZONE BOUNDARY TABLE

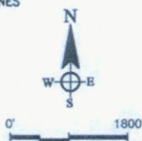
ZONE	ZONE BOUNDARY	HIGH WATER
H	3015 ~ 3120	3212
I+	3120 ~ 3225	3317
J	3225 ~ 3330	3422

## EXHIBIT 1

## SAGUARO WATER COMPANY

WATER SYSTEM MASTER PLAN

WestLand Resources Inc.  
Engineering and Environmental Consultants  
4001 E. Primavera Parkway Drive  
Tucson, AZ 85712 (520) 708-9900



## **EXHIBIT B**

Saguaro Water  
Computation of Off-Site Facilities Hook-up Fee (HUF)

Line  
No.

1			
2	<u>Off-Site Capital Expenditure Requirements<sup>1</sup></u>		
3			
4	Infrastructure upgrades per the Water System Master Plan		\$ 555,000
5			
6			
7	Total [1]		<u>\$ 555,000</u>
8			
9	Anticipated Customer Growth (EDU's) <sup>1,2</sup> [2]	<u>334</u>	
10			
11			
12	Construction Costs Expected to be Funded by HUF [3] = Percent times [1]	60%	\$ 333,000
13			
14	HUF for EDU (5/8 Inch Metered Customer) (rounded down) [4] = [3] divided by [2]		\$ 920
15			
16	<u>Proposed Off-site Facilities Hook-up Fees by Meter Size</u>		
17			
18	<u>Meter Size</u>		
19	5/8 Inch	\$ 920 [4]	
20	3/4 Inch	\$ 1,380 Scaled on 5/8 meter flow	
21	1 Inch	\$ 2,300 Scaled on 5/8 meter flow	
22	1 1/2 Inch	\$ 4,600 Scaled on 5/8 meter flow	
23	2 Inch	\$ 7,360 Scaled on 5/8 meter flow	
24	3 inch	\$ 14,720 Scaled on 5/8 meter flow	
25	4 Inch	\$ 23,000 Scaled on 5/8 meter flow	
26	6 Inch	\$ 27,600 Scaled on 5/8 meter flow	

27

28 <sup>1</sup> See Water System Master Plan prepared by Westland Resources for Saguaro Water Company.

29

30 <sup>2</sup> Equivalent Dwelling Units (EDU) is defined as water usage for a single-family residential unit. A typical single-family  
31 residential unit is served by a 5/8 inch meter.

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